

Gluten free Carbohydrate Counting

3rd Feb 2018, Ittefaq Hospital, Lahore

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Goals and Objectives

- ❑ Recap of Type 1 DM and carbohydrate Counting
- ❑ To understand the physiology of celiac disease
- ❑ To understand the Nutritional Requirements of Type 1 kids with celiac disease
- ❑ Difference of Carbohydrate content of different cereals and grains.
- ❑ Best gluten free combination similar to wheat like Carbohydrate content

Recap of Type I DM

Type 1A diabetes mellitus results from autoimmune destruction of the insulin-producing beta cells in the islets of Langerhans. This process occurs in genetically susceptible subjects, is probably triggered by one or more environmental agents, and usually progresses over many months or years during which the subject is asymptomatic and euglycemic(1)

Onset most often occurs in childhood, but the disease can also develop in adults in their late 30s and early 40s.(2)

(1) Massimo Pietropaolo, MD, McNair, **Pathogenesis of type 1 diabetes mellitus up to date**, Baylor College of Medicine

(2) [J Pediatr Gastroenterol Nutr](#). 2005 Nov;41(5):621-4.

Carbohydrate is important to controlling your blood glucose levels. The amount you need to eat depends on your age, weight and how active you are.

How to calculate recommended gms. of carbohydrates to be consumed for

Type 1 Diabetes:

Insulin to Carbohydrate ratio (ICR)=

Daily Carbohydrate intake (gms.) / Total Daily Bolus Insulin (units)

Insulin Sensitivity factor (ISF)= $1700 / \text{Total Insulin Units (Basal + Bolus)}$

غذائی نشاستہ شماری

CARBOHYDRATE COUNTING FOR CARB CONSISTENT DIET

خون میں شکر کی مقدار متوازن رکھنے کا طریقہ کار:-

اگر آپ ذیابیطس کے مریض ہیں تو خون میں شکر کی مقدار کا تناسب درست رکھنا آپ کے لئے نہایت ضروری اور مفید ہے۔
"carb counting" یا غذا میں نشاستے کی مقدار کا شمار ایک ایسا طریقہ کار ہے جس کی بدولت آپ کو نہ صرف یہ پتا چلتا ہے کہ کس قسم کی غذا آپ کے خون میں شکر کے تناسب پر کس قدر اثر انداز ہوتی ہے بلکہ یہ بھی کہ آپ کس طرح اپنے ہر کھانے میں نشاستے کی مقدار کی کتنی کر کے اپنے خون میں شکر کا تناسب درست رکھ کر ذیابیطس کو کنٹرول کر سکتے ہیں۔

☆ خواتین کے لئے نشاستے کی مطلوبہ مقدار:-

خواتین کو عام طور پر ہر کھانے میں 45 سے 60 گرام نشاستہ درکار ہوتا ہے۔

☆ مردوں کے لئے نشاستے کی مطلوبہ مقدار:-

مردوں کو عام طور پر ہر کھانے میں 60 سے 75 گرام نشاستہ درکار ہوتا ہے۔

نشاستہ اور خون میں شکر کا تناسب:-

جب آپ کوئی نشاستہ دار غذا (مثلاً دودھ، پھل، روٹی، دالیں یا پاستا وغیرہ) کھاتے ہیں تو وہ ہضم ہونے کے بعد خون میں شکر (glucose) کی صورت میں شامل ہو جاتی ہے جس سے آپ کے خون میں شکر کا تناسب بڑھتا ہے۔

مندرجہ ذیل فہرست میں چند عام غذائی اشیاء شامل ہیں جن کے ہر Portion میں 15 گرام نشاستہ (One Carbohydrate

Choice) موجود ہے۔

☆ تمام غذائی اشیاء جن میں 20 کیلو ریڈ یا 5 گرام کاربوہائیڈریٹ سے کم نشاستہ پایا جاتا ہے، انہیں "Free" تصور کیا جاتا ہے مثلاً شوگر فری مشروبات، شوگر فری بہت، مصاوغات)

روٹی، چاول اور اتاج

ایک اونس روٹی یا آدھی روٹی (8 انچ پیرائی کی) یا 1/4 نان (8 جوڑائی کا)

دس روٹی کا ایک سلاکس (ایک اونس)

1/3 کپ پکے ہوئے چاول یا پاستا (Pasta)

ایک کپ چکن نوڈلز سوپ (Noodles Soup)

3/4 کپ پھیکا ٹھنڈا سیریل (Cereal) مثلاً کارن فلیکس

3 کپ پاپ کارن (Popcorn) (کم آئل میں بنے ہوئے)

دودھ اور دہی

1 کپ دودھ یا دہی (3/4 کپ) (8 اونس)

6 اونس فلیوریڈ (flavoured) دہی (کم کیلوری والے sweetener سے بنا ہوا)

پھل

1 چھوٹا پھل

آدھا درمیانہ پھل (سیب، کیلا)

1/2 کپ ٹن میں بند پھل (اپنے ہی رس کے ساتھ)

1 کپ خربوزہ / گراما

1/2 کپ پھل کا خالص رس (pure fruit juice)

2 کھانے کے چمچے خشک میوے جات (dry fruits)

1 اور 1 چوتھائی کپ اسٹرابیری (strawberries)

3/4 کپ بلیک بیریز یا بلیو بیریز (blackberries / blueberries)

سبزیاں اور دالیں

آدھا کپ آلو یا شکرکندی یا مٹر یا مکئی یا ایک چھوٹا آلو

آدھا کپ پکا ہوا لوبیا یا پھلیاں یا دالیں (beans, legumes, pulses)

1 کپ کدو

ڈیزھ کپ کئی سبزی (غیر نشاستہ دار سبزیوں کی کم مقدار کو "Free" تصور کیا جاتا ہے)

Snacks

3/4 اونس Snack food (4 سے 6 نمکین crackers)

15 آلو کے چپس


1 اونس میٹھا Snack (2 چھوٹے کوکیز یا 5 Vanilla wafers)

1 کھانے کا چمچ چینی یا شہد

آدھا کپ آئسکریم (Regular)

What is celiac Disease?

- ❑ Celiac disease is an immune-based reaction to dietary gluten (storage protein for wheat, barley, and rye) that primarily affects the small intestine in those with a genetic predisposition and resolves with exclusion of gluten from the diet.
- ❑ It can be symptomatic (with GI disturbances or non-GI abnormalities)
- ❑ It can be Asymptomatic

- 
- Prevalence
 - 5% of diabetics have celiac disease as well

Gastrointestinal Manifestations ("Classic")

Most common age of presentation: 6-24 months

- **Chronic or recurrent diarrhea**
- **Abdominal distension**
- **Anorexia**
- **Failure to thrive or weight loss**
- **Abdominal pain**
- **Vomiting**
- **Constipation**
- **Irritability**

Rarely: Celiac crisis

Non Gastrointestinal Manifestations

Most common age of presentation: older child to adult

- **Dermatitis Herpetiformis**
- **Dental enamel hypoplasia of permanent teeth**
- **Osteopenia/Osteoporosis**
- **Short Stature**
- **Delayed Puberty**
- **Iron-deficient anemia resistant to oral Fe**
- **Hepatitis**
- **Arthritis**
- **Epilepsy with occipital calcifications**

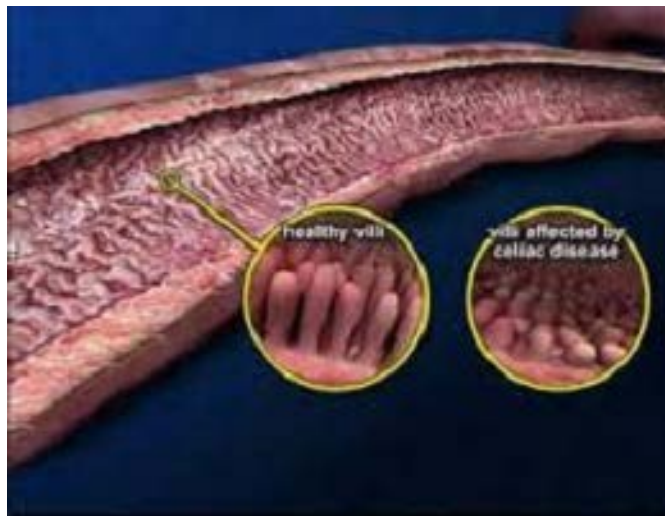
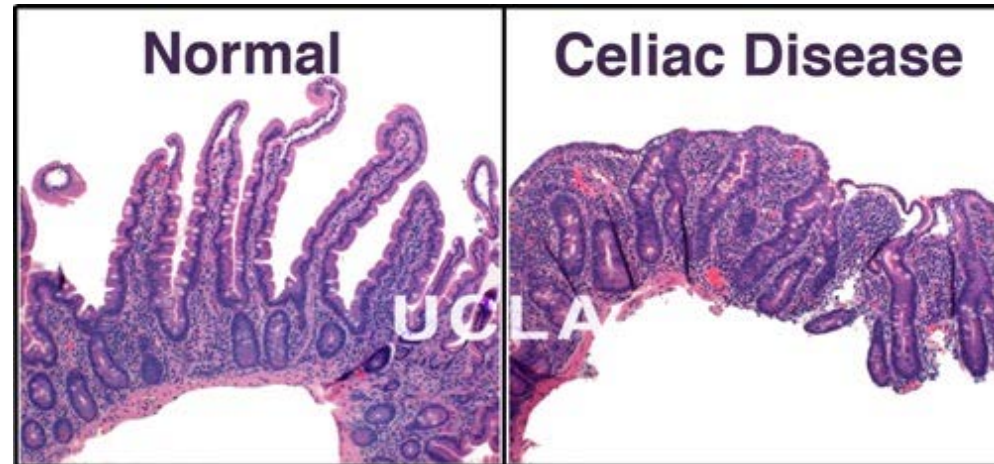
Listed in descending order of strength of evidence 10



Diagnosis of Celiac disease

- ❑ Serologic testing of gluten related anti bodies
- ❑ Confirmation by duodenal mucosal biopsies

Alberto Rubio-Tapia, MD¹, Ivor D. Hill, MD², Ciarán P. Kelly, MD³, Audrey H. Calderwood, MD⁴
and Joseph A. Murray, MD. *Am J Gastroenterol* 2013; 108:656–676; doi:10.1038/ajg.2013.79; published
online 23 April 2013





Management and Treatment

For people with coeliac disease and Type 1 diabetes, following a gluten-free diet can help control their symptoms and reduce the risk of complications.

Sources of Gluten



- **OBVIOUS SOURCES**
 - Bread
 - Bagels
 - Cakes
 - Cereal
 - Cookies
 - Pasta / noodles
 - Pastries / pies
 - Rolls



Type 1 DM + Celiac Disease

If you have Type 1 diabetes and are diagnosed with coeliac disease, your blood glucose may change after you start the gluten-free diet. This can happen because taking gluten out of your diet allows the lining of your gut to heal so absorption of nutrients, including carbohydrate, will improve.

In majority of the cases, celiac disease is followed by Type 1 DM but get diagnosed late and is usually diagnosed when lab testing is done for diagnosis of Diabetes.

Type I DM + Celiac disease

British Society of Paediatric Gastroenterology, Hepatology and Nutrition (BSPGHAN) recommended that children with Type 1 diabetes should be retested for celiac disease after three years or if symptoms occur.

Celiac disease is more common in people who have Type 1 diabetes because they are both autoimmune diseases. Between 4 and 9% of people with Type 1 diabetes will also have coeliac disease.

But there is no increased risk of celiac disease in people with Type 2 diabetes.

1 Valerio G, Maiuri L, Troncone R, et al (2002) Severe clinical onset of diabetes and increased prevalence of other autoimmune diseases in children with coeliac diabetes diagnosed before diabetes mellitus. *Diabetologia*. 45(12): 1719-22.

2 Hansen D, Bennedbaek FN, Hansen LK, et al (2001) High prevalence of celiac disease in Danish children with type 1 diabetes mellitus. *Acta Paediatrica*. 90:1238-43.

3 Bradbury BL & Scarpello JHB (1999) Recurrent hypoglycaemia as the presenting symptom of coeliac disease in a patient with Type 1 diabetes mellitus. *Pract Diab Int* 16: 89-90.

Label Reading:

Total Carbohydrates

The total carbohydrate content includes all three types of carbohydrates: sugars, starches and fiber. Sugars and starches are the body's preferred sources of energy because they're easily digested into glucose, or blood sugar. One cup of all-purpose, or white, wheat flour has 95.39 grams of total carbohydrates. The same portion of whole-grain wheat flour has 86.36 grams.

Sugars

Sugars are called simple carbohydrates because they're made from just one or two molecules of sugar. Your body only absorbs carbohydrates after they're broken down into a single molecule of sugar, so the shorter the chain, the more quickly the sugar enters your blood stream. Wheat flour is naturally low in sugar. One cup of all-purpose wheat flour has 0.34 grams and whole-grain wheat flour has 0.49 grams of sugar. (injection of sugar)

Starches

Better known as complex carbohydrates, starches have three or more molecules of sugar, so they take longer to digest than simple sugar. Starches have another advantage: they contain vitamins and minerals, while sugars are pure calories without nutrients. The Nutrition Facts label doesn't give information about starch content, but it's the amount of carbohydrates that remain after you deduct sugars and fiber from the total carbohydrates. The starches in all-purpose flour account for about 96 percent of the total carbohydrates. Those in whole-grain wheat flour represent about 85 percent of total carbs.(Time release capsule)

Fiber

Dietary fiber is different from the other carbohydrates because it's not digested. Even though it doesn't provide energy, fiber has other essential roles. Soluble fiber lowers cholesterol and may prevent diabetes by keeping blood sugar balanced. Insoluble fiber adds bulk to food and prevents constipation by moving food through the digestive tract. The fiber content in wheat flour is determined by the amount of whole grains. To produce white wheat flour the bran and germ, which contain most of the fiber, are removed from the whole grain. One cup of all-purpose wheat flour has 3.4 grams of fiber. Whole-grain wheat flour has 12.8 grams of fiber per cup.

Gluten Free Grains

Whole grains are important for everyone. They're naturally high in fiber, low in fat and filling to eat. And, when eaten regularly, whole grains help reduce the risk of heart disease, diabetes and certain cancers.

The Dietary Guidelines for Americans recommend that at least half of your daily servings of grains be whole grain. This means three servings a day for most people.

The most common whole-grain foods (breads, baked goods, cereals, pasta and crackers) contain gluten. This makes getting enough whole grains even tougher for those with celiac disease because they must avoid wheat, rye and barley because of their gluten content. So, here are five gluten-free whole grains, how to cook them and how to add them to your diet. Aim for three servings of whole grains a day.

Amaranth (Arjeera Atta): About the size of a poppy seed, this pseudo-grain has a light peppery taste. Use 3 to 6 parts water to 1 part amaranth. Boil water, add grain and gently boil for 15 to 20 minutes. As it cooks, amaranth softens from the inside, releases a lot of starch and thickens the cooking liquid. Rinse cooked amaranth and let it drain before using. Use amaranth to thicken soups and stews. Add milk, fruit and a bit of honey for a healthy breakfast. You can even "pop" dried amaranth and make it into a granola-type bar.

Millet (Bajra): About the size of a small mustard seed, this grain has a mild flavor. Use 2 to 3 parts water to 1 part millet. Boil water, add grain and gently boil for 35 to 40 minutes. You may also "toast" millet in a hot pan before boiling to get a nuttier flavor. Top with cinnamon and peaches for breakfast. Or make a salad with halved grape tomatoes, radishes and chopped basil. Millet is also a great alternative to rice in casseroles, ground-meat dishes and stuffing.

Teff (Equivalent to Jawar): This smallest of grains is nutty and earthy in flavor. Use 3 parts water to 1 part teff. Boil water, add grain and simmer for 15 to 20 minutes. Its texture is like cream of wheat. Add cooked teff to soups or use teff as the main ingredient for polenta instead of cornmeal. Teff flour can be used to make pancakes.

Buckwheat: Despite its name, buckwheat is not related to wheat. This-pseudo grain is pyramid shaped and known as kasha or buckwheat groats. To bring out its earthy flavor, cook 1 cup buckwheat with one egg in a large skillet over medium heat. Stir to keep from clumping until the mixture is dry and separated. Add 2 cups water or broth and cook uncovered over low heat for about 15 minutes. Mix cooked buckwheat with lentils, herbs or stuff peppers or acorn squash with cooked buckwheat. Buckwheat flour can be used to make pancakes.

Quinoa (Bahi Dana): This pseudo-grain must be rinsed well before cooking to remove bitter-tasting saponins. You can also buy it pre-rinsed. The flavor is squash-like. Quinoa cooks in just 15 minutes. Use 2 parts water to 1 part quinoa. Mix with chopped fruit and drizzle with honey for breakfast. Quinoa is also a good substitute for rice in rice pudding.

“these whole grains are good for all”.

Millet...bajra

50-60gm roti provides 36-44gm carbohydrates



Teff...jawar

50-60gm roti provides 36-44gm carbohydrates



Teff Seeds

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Quinea flour: 50-60 gm roti (Approx. 2 oz.) provides
32-38gm carbohydrates



Amaranth..arjeera atta

50-60gm roti provides 32-39gm carbohydrates



Chick peas Flour (Besan)



Rice Flour



Soya Beans



Corn starch and corn flour



Potato Starch



Why make your own chakki atta?

Luckily, we have wonderful blends of gluten free grains available in market...local and imported...

But for type 1 DM, its very important to know the carbohydrate content of product to fit into regular meals of the day according to their insulin to carbohydrate ratio.....

Unfortunately, many locally made products don't mention on label the exact carbohydrate content...and there comes the responsibility of patient to have their own blends of grains....

Another reason is to have a more nutritious blend



The most cost-effective and healthy way to follow the gluten-free diet is to seek out these **naturally gluten-free food groups, which include:**

Fruits

Vegetables

Meat and poultry

Fish and seafood

Dairy

Beans, legumes, and nuts



Comparison of Carbohydrate Content of different grains and pulses family

Whole wheat flour: 50-60gm (approx. 2 oz.) Roti provides 30gm Carbohydrates

Approx. **20 rotis/1 kg whole wheat flour (8" diameter or 2 oz.)**

Flour: 50-60gm (approx. 2 oz.) puri provides 38-45gm carbohydrates

Gluten free options:

Amaranth: 50-60gm roti provides 32-39gm carbohydrates

Quinoa: 50-60 gm roti (Approx. 2 oz.) provides 32-38gm carbohydrates

Millet: 50-60gm roti provides 36-44gm carbohydrates

Teff: 50-60gm roti provides 36-44gm carbohydrates

Besan 50-60 gm (approx. 2 oz.) roti provides 28-34gm carbohydrates

Rice flour: 50-60gm (approx. 2 oz.) roti provide 40-48gm carbohydrates

Whole grain cornflour: 50-60gm (approx. 2 oz.) roti provide 38-45gm carbohydrates

soya flour: 50-60gm (approx. 2 oz.) roti provide 17-21gm carbohydrates.

Potato flour: 50-60 gm (approx. 2 oz.) roti provides 41-50gm carbohydrates

General Guidelines:

1. Eat three meals a day

Eat at breakfast, lunch and dinner and try not to skip meals. This will help control your appetite and blood glucose levels.

2. Include gluten-free starchy carbohydrate foods at each meal e.g.

gluten-free breads (whole wheat is better), pasta and biscuits

naturally gluten-free grains such as rice, rice noodles, polenta (cornmeal), buckwheat, millet and quinoa

starchy vegetables such as new potatoes, sweet potatoes, yams, cassava (tapioca) and plantains

gluten-free breakfast flakes and muesli.

3. Cut down on the amount of fat you eat, particularly saturated fats i.e. butter, margarine. Fatty meats

Choose lower fat dairy foods-----Cooking methods

4. Eat more fish

All plain fish is naturally gluten-free. Oily fish such as mackerel, sardines and salmon are high in omega 3 fats which may help prevent heart disease. Talk to your healthcare professional about how much you should eat.

5. Limit sugar and sugary foods

Sugar is not forbidden when you have diabetes, but constantly having foods and drinks that are high in sugar does not help to control your blood glucose. Choosing sugar free, no added sugar or diet squashes and fizzy drinks can be an easy way to reduce the sugar in your diet.

6. Reduce salt in your diet

We should all aim to have 6g or less of salt each day. More than this can raise blood pressure, which can lead to stroke and heart disease. Reduce the amount of processed foods you eat as these can be high in salt. Try flavouring foods with herbs, spices and pepper which are all gluten-free.

7. Eat more fruit and vegetables

All fresh, frozen, canned, juiced and dried fruits are naturally gluten-free. Aim to eat at least five portions a day.

8. Include more pulses

Peas, beans and lentils are naturally gluten-free. Try adding them to stews, soups, curries and salads.

9. Drink alcohol in moderation

Gluten-free beers

10. Avoid diabetic food and drinks

These are often expensive, contain just as much fat and calories as ordinary versions, can have a laxative effect and will still affect your blood glucose levels.

Suggestions

- Suggestions for making a gluten free roti with carbohydrate content to be closer to **whole wheat roti** i.e.
- **8” diameter Roti or 2oz. Or 60 gm Roti =30 gm carbohydrates**
- Combine 2 portions of soya flour and 1 portion of rice flour =30gm CHO roti
- Combine 2 portions of Besan and 1 portion of Jawar or Bajra flour



• Interactive Session

- Jawar: 50-60 gm roti provides 36-44gm carbohydrates
- Bajra: 50-60 gm roti provides 36-44gm carbohydrates
- Quinea flour: 50-60 gm roti (Approx. 2 oz.) provides 32-38gm carbohydrates
- Besan 50-60 gm (approx. 2 oz.) roti provides 28-34gm carbohydrates
- Rice flour: 50-60gm (approx. 2 oz.) roti provide 40-48gm carbohydrates
- Yellow whole grain corn flour: 50-60 gm (approx. 2 oz.) roti provide 38-45gm carbohydrates “**corn gluten**” is not the same gluten
- soya flour: 50-60gm (approx. 2 oz.) roti provide 17-21gm carbohydrates.
- Potato flour: 50-60 gm (approx. 2 oz.) roti provides 41-50gm carbohydrates



And our creativity is endless.....



Thank you Questions and Comments

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